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METHODS OF COAL STACKING

Produced coal is generally loaded in trucks or wagons by excavators and loaders to be transported then to the storage areas. Belt conveyor is another transportation alternative.

In recent years, the increased transportation capacities of trucks, their ability to function in topographic irregularities, and their easy adaptation to the changes in working areas are the reasons for preference of transportation by trucks.

In the enterprises where bucket wheel excavators are used, the transportation of coal to the storage area by means of conveyor belt bridges becomes possible. Same operations are relevant for the transportation of the coal carried by ships from the harbor to the storage area. The coal transported to the storage area is spread by movable or fixed belt systems and according to desired stacking geometry. Mobile belt systems generally move on railway or caterpillar (Yu, 1973).

In many countries various stacking techniques are applied by taking some factors into account such as the climate conditions, dimensions and design of storage area and the machinery used for this purpose.

Three methods that are widely used will be explained here with their main characteristics.

1. **Windrow Method**

   In this method, the stacker moving on rails spills the coal in parallel rows along the silo's length by changing the boom angle from the ground level. As shown in Figure 1-a, the stacker performs the operation by traveling forth and back along the stacking area and beginning to spill the first rows then the second, third rows and so on. A very good blend can be obtained when the coal is taken by a reclaimer from the stack formed with this method.

   Disadvantage of this method is collection of rain water between the coal rows and penetration in the stack as a result of long lasting and continuous rainfall (Wöhlbier, 1975).

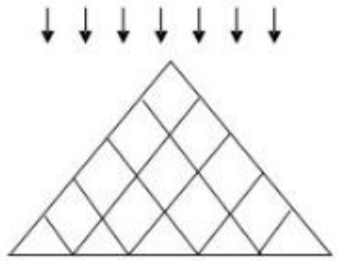

Figure 1-a. Windrow Method

2. Chevron Method

In Chevron Method, the stacker moves along the storage area on an axis which divides the area in equal parcels and spills the coal in triangular prism-shaped stacks. As shown in Figure 1-b, the stacking operation is first performed along the first prism. The machine spills the second layer on its way back and continues the same operation until the desired final stack height is reached. When this method is used, the rain water flows down on the slopes of the stacked coal. In summer time, since the surface area exposed to the hot air is larger, drying effect becomes more significant. In addition, the rock particles not picked out in the production process, roll down on the slopes during stacking and consequently separated from the coal (Wöhlbier, 1975)

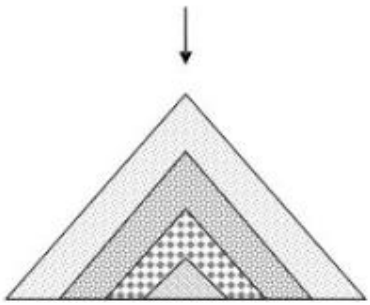

Figure 1-b. Windrow Method

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3. Cone Shell Type Method

In Cone Shell Type Method, the stacker spills the coal in cone shape until the final stack height is reached. As shown in Figure 1-c, the stacker begins to spill the first cone, then moves one step forward to spill the second cone until the stack height and continues the operation step by step.

This method can be applied in areas where long and rigorous winter conditions prevail in order to ensure that stacked coal is affected by rain water at minimum level. In case Windrow and/or Chevron methods among the ones briefly explained above are used for storage, a very good blend is obtained when the coal is taken from the stack by a reclaimer.

For an optimum blend, the reclaimer has to work perpendicularly to the long axis of the stack. To adjust the calorific value of the blend, high calorific valued coal can be added during the stacking operation (Wöhlbier, 1975).

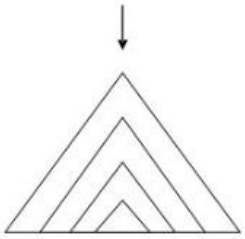

Figure 1-c. Cone Shell Type Method

The coal stacks formed in open areas can be generally in cone, prism, cut cone/prism etc. shaped. Geometric shapes frequently used in coal stacking are shown in Figure 2.

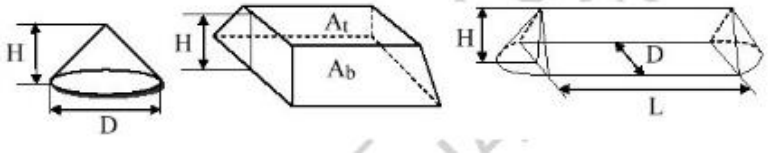

Figure 2. Examples about Stacking Geometry of Coal (Mine Storage, 1959)

Reference:

[1] Energy Storage Systems- Vol. II – Storage of Coal: Problems and Precautions - G. Ökten, O. Kural and E.Algurkaplan.